

WHAT IS CLAIMED IS:

1. A crash cushion comprising:
a resilient, self-restoring cylinder having a substantially vertical longitudinal axis and an outer surface comprising a curved portion adapted to be
5 exposed to a roadway; and
a deflector skin comprising an inner surface and an outer surface and having a curved contour shaped to mate with said curved portion of said outer surface of said cylinder, wherein said deflector skin is mounted to said cylinder on said outer surface over at least a portion of said curved portion of said outer
10 surface that is adapted to be exposed to the roadway.
2. The invention of claim 1 wherein cylinder has a circular cross-section.
3. The invention of claim 1 wherein said deflector skin comprises a first deflector skin, and further comprising a second deflector skin mounted on
15 said outer surface of said first deflector skin.
4. The invention of claim 3 wherein said second deflector skin is substantially flat and extends substantially tangentially from said outer surface of said first deflector skin.
5. The invention of claim 3 wherein said second deflector skin has a
20 leading edge and a trailing edge, wherein said leading edge of said second deflector skin is mounted to said first deflector skin and wherein said trailing edge is a free edge.
6. The invention of claim 5 wherein said first deflector skin has a leading edge and a trailing edge, wherein said leading and trailing edges of said
25 first deflector skin are secured to said cylinder.
7. The invention of claim 6 wherein said trailing edge of said first deflector skin is secured to said cylinder with a first plurality of fasteners, and

wherein said leading edges of said first and second deflector skins are secured to said cylinder with a second plurality of fasteners.

8. The invention of claim 3 wherein said first and second deflector skins comprise a first and second thickness respectively, wherein said second thickness of said second deflector skin is greater than said first thickness of said first deflector skin.

9. The invention of claim 3 wherein said first and second deflector skins are made at least in part of metal, and wherein said cylinder is made at least in part of a polymeric material.

10. The invention of claim 1 wherein said cylinder is made at least in part of an elastomeric material.

11. The invention of claim 1 wherein said outer surface of said cylinder defines a perimeter of said cylinder, wherein said deflector skin extends around only a portion of said perimeter.

12. A crash cushion system comprising:
an array of resilient, self-restoring cylinders each having a substantially vertical longitudinal axis and an outer surface comprising a curved portion, wherein said array comprises a plurality of said cylinders, and wherein said array of cylinders has a front, a side and a rear, wherein said side is defined at least in part by said curved portions of at least some of said plurality of said cylinders; and

at least one deflector skin comprising an inner surface and an outer surface and having a curved contour shaped to mate with said curved portion of said outer surface of at least one of said cylinders forming said side of said array, wherein said at least one deflector skin is mounted to said at least one of said cylinders on said outer surface thereof over at least a portion of said curved portion that defines part of said side of said array.

13. The invention of claim 12 wherein said at least one deflector skin comprises a plurality of deflector skins each comprising an inner surface and an outer surface and having a curved contour shaped to mate with said outer surface of a corresponding one of at least some of said cylinders forming said side of said array, wherein each of said plurality of said deflector skins is mounted on said
5 outer surface of said corresponding one of said cylinders over at least a portion of said curved portion of said outer surface that defines part of said side of said array.

14. The invention of claim 13 wherein said plurality of deflector skins comprises a plurality of first deflector skins, and further comprising a plurality of
10 second deflector skins each mounted on said outer surface of a corresponding one of said plurality of said first deflector skins.

15. The invention of claim 14 wherein said each of said plurality of second deflector skins is substantially flat and extends tangentially from said outer surface of said corresponding one of said plurality of said first deflector skins.

16. The invention of claim 15 wherein each of said corresponding ones of said cylinders comprises an outermost vertically oriented tangent, and wherein said leading edge of each of said plurality of said second deflector skins is mounted on said first deflector skin forwardly of said tangent on said
15 corresponding one of said cylinders.

17. The invention of claim 14 wherein each of said plurality of said second deflector skins has a leading edge and a trailing edge, wherein said leading edge of each of said plurality of said second deflector skins is secured to said corresponding one of said plurality of said first deflector skins and wherein said trailing edge is a free edge.
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18. The invention of claim 17 wherein said each of said plurality of said first deflector skins has a leading edge and a trailing edge, wherein said leading and trailing edges of each of said plurality of said first deflector skins are secured to said corresponding one of said cylinders.
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19. The invention of claim 14 wherein each of said plurality of said first deflector skins has a first thickness and wherein each of said plurality of said second deflector skins has a second thickness, wherein said second thickness of each of said plurality of said second deflector skins is greater than said thickness of said corresponding one of said plurality of said first deflector skins.

20. The invention of claim 14 wherein said plurality of said first deflector skins and said plurality of said second deflector skins are made at least in part of metal, and wherein said plurality of cylinders are made at least in part of a polymeric material.

21. The invention of claim 13 wherein said outer surface of said corresponding ones of said cylinders each define a perimeter of said corresponding ones of said cylinders, wherein said deflector skins each extend around only a portion of said perimeter of said corresponding one of said cylinders.

22. The invention of claim 12 wherein each of said plurality of cylinders is made in part of an elastomeric material.

23. A crash cushion system comprising:
an array of resilient, self-restoring cylinders each having a substantially vertical longitudinal axis and an outer surface comprising a curved portion, wherein said array comprises a plurality of said cylinders, and wherein said array of cylinders has a front, a side and a rear, wherein said side is defined at least in part by said curved portions of at least some of said plurality of said cylinders, wherein each of said plurality of said cylinders defining said side comprises an outermost vertically oriented tangent; and

at least one deflector skin mounted on at least one of said plurality of said cylinders forming said side of said array, wherein said deflector skin comprises a leading edge and a trailing edge, wherein said leading edge of said at least one deflector skin is secured to said at least one cylinder forwardly of said tangent on said at least one cylinder.

24. The invention of claim 23 wherein said at least one deflector skin comprises a plurality of deflector skins each mounted on a corresponding one of at least some of said cylinders forming said side of said array, wherein each of said plurality of said deflector skins comprises a leading edge and a trailing edge,
5 wherein said leading edge of each of said plurality of said deflector skins is secured to said corresponding one of said cylinders forwardly of said tangent on said corresponding one of said cylinders.

25. The invention of claim 24 wherein said tangents of said corresponding ones of said cylinders in combination define a substantially vertical
10 plane and wherein each of said plurality of said deflector skins is substantially flat and is oriented in a non-parallel relationship with said vertical plane.

26. The invention of claim 25 wherein said plurality of said deflector skins comprises a plurality of second deflector skins, and further comprising a plurality of first deflector skins disposed between said corresponding ones of said
15 cylinders and said plurality of said second deflector skins secured thereto.

27. The invention of claim 26 wherein each of said plurality of said first deflector skins has a curved contour shaped to mate with said curved portion of said outer surface of said corresponding one of said cylinders.

28. The invention of claim 26 wherein each of said plurality of said first
20 deflector skins has a first thickness and wherein each of said plurality of said second deflector skins has a second thickness, wherein said second thickness of each of said second deflector skins is greater than said first thickness of a corresponding one of said first deflector skins.

29. The invention of claim 26 wherein each of said plurality of said first
25 and second deflector skins is made at least in part of metal, and wherein each of said plurality of said cylinders is made at least in part of a polymeric material.

30. The invention of claim 26 wherein said outer surface of said corresponding ones of said cylinders each define a perimeter of said corresponding

ones of said cylinders, wherein said first deflector skins each extend around only a portion of said perimeter of said corresponding one of said cylinders.

31. The invention of claim 23 wherein each of said plurality of said cylinders is made at least in part of an elastomeric material.

5 32. The invention of claim 23 wherein said trailing edge of each of said plurality of said deflector skins is a free edge, and wherein said free edge of a first one of said plurality of deflector skins extends rearwardly beyond said leading edge of a next adjacent second one of said plurality of said deflector skins positioned rearwardly of said first deflector skin.

10 33. A method for attenuating the impact of a vehicle striking a crash cushion system comprising:

providing a crash cushion having a front, a rear and first and second sides, wherein at least one of said rear and said second side is positioned adjacent a rigid object, said crash cushion comprising an array of resilient, self-restoring
 15 cylinders each having a substantially vertical longitudinal axis and an outer surface comprising a curved portion, wherein said array comprises a plurality of said cylinders, and wherein at least said first side of said crash cushion is defined at least in part by said curved portions of at least some of said plurality of said cylinders, and wherein said crash cushion further comprises at least one deflector
 20 skin comprising an inner surface and an outer surface and having a curved contour shaped to mate with said curved portion of said outer surface of at least one of said cylinders forming said side of said crash cushion, wherein said at least one deflector skin is mounted to said at least one of said cylinders on said outer surface thereof over at least a portion of said curved portion that defines part of said first
 25 side of said crash cushion; and

impacting said crash cushion with said vehicle.

34. The method of claim 33 wherein said at least one deflector skin comprises a plurality of deflector skins each comprising an inner surface and an

outer surface and having a curved contour shaped to mate with said outer surface of a corresponding one of at least some of said cylinders forming said first side of said crash cushion, wherein each of said plurality of deflector skins is mounted on said outer surface of said corresponding one of said cylinders over at least a
 5 portion of said curved portion of said outer surface that forms part of said first side of said crash cushion.

35. The method of claim 34 wherein said impacting said crash cushion with said vehicle comprises impacting said side of said crash cushion and thereby impacting at least one of said plurality of said deflector skins.

10 36. The method of claim 33 wherein said plurality of deflector skins comprises a plurality of first deflector skins, and further comprising a plurality of second deflector skins mounted on said outer surface of corresponding ones of said plurality of said first deflector skins, and wherein said impacting said crash cushion with said vehicle comprises impacting said side of said crash cushion and
 15 impacting at least one of said plurality of said second deflector skins.

37. The method of claim 36 wherein said each of said plurality of said second deflector skins is substantially flat and extends tangentially from said outer surface of said corresponding one of said plurality of said first deflector skins.

20 38. The method of claim 36 wherein each of said plurality of said second deflector skins has a leading edge and a trailing edge, wherein said leading edge of each of said plurality of said second deflector skins is secured to said corresponding one of said plurality of said first deflector skins and wherein said trailing edge is a free edge.

25 39. The method of claim 36 wherein each of said plurality of said cylinders defining said side comprises an outermost vertically oriented tangent, and wherein said leading edge of each of said plurality of said second deflector skins is mounted on said corresponding one of said plurality of said first deflector skins forwardly of said tangent on said corresponding one of said cylinders.

40. The method of claim 34 wherein said plurality of deflector skins comprises a plurality of first deflector skins, and further comprising a plurality of second deflector skins each mounted on said outer surface of a corresponding one of said first deflector skins, and wherein said impacting said crash cushion with
 5 said vehicle comprises impacting said front of said crash cushion and thereby compressing at least some of said plurality of said cylinders from said front to said rear of said crash cushion, and wherein said plurality of said second deflector skins are not substantially deformed by said impacting said front of said crash cushion and said compressing said at least said some of said plurality of said cylinders.

10 41. The method of claim 40 wherein said compressing said at least said some of said plurality of said cylinders comprises deforming at least some of said first deflector skins, and further comprising restoring said at least some of said compressed plurality of said cylinders to substantially their original shape, and further comprising restoring said at least some of said deformed first deflector
 15 skins to substantially their original shape.

42. A method for attenuating the impact of a vehicle striking a roadside crash cushion system comprising:
 providing a crash cushion having a front, a rear and first and second sides, wherein at least one of said rear and said second side is positioned adjacent
 20 a rigid object, said crash barrier comprising an array of resilient, self-restoring cylinders each having a substantially vertical longitudinal axis and an outer surface comprising a curved portion, wherein said array comprises a plurality of said cylinders, and wherein at least said first side of said crash cushion is defined at least in part by said curved portions of at least some of said plurality of said
 25 cylinders, wherein each of said plurality of said cylinders defining said side comprises an outermost vertically oriented tangent, and wherein said crash cushion further comprises at least one deflector skin mounted on at least one of said plurality of said cylinders forming said side, wherein said at least one deflector skin comprises a leading edge and a trailing edge, wherein said leading

edge of said at least one deflector skin is secured to said at least one of said cylinders forwardly of said tangent on said at least one of said cylinders; and impacting said crash cushion with said vehicle.

5 43. The method of claim 42 wherein at least one deflector skin comprises a plurality deflector skins each mounted on a corresponding one of at least some of said cylinders forming said side, wherein each of said plurality of deflector skins comprises a leading edge and a trailing edge, wherein said leading edge of each of said plurality of deflector skins is secured to said corresponding
10 one of said cylinders forwardly of said tangent on said corresponding one of said cylinders

 44. The method of claim 43 wherein said tangents of said corresponding ones of said cylinders in combination define a substantially vertical plane and wherein each of said plurality of said deflector skins is substantially flat and is
15 oriented in a non-parallel relationship with said vertical plane.

 45. The method of claim 44 wherein said impacting said crash cushion with said vehicle comprises impacting said side of said crash cushion and impacting at least one of said deflector skins.

 46. The method of claim 45 wherein said plurality of deflector skins
20 comprises a plurality of second deflector skins, and further comprising a plurality of first deflector skins disposed between said corresponding ones of said cylinders and said plurality of said second deflector skins secured thereto.

 47. The method of claim 46 wherein each of said plurality of said first deflector skins has a curved contour shaped to mate with said curved portion of
25 said outer surface of said corresponding one of said cylinders.

 48. The method of claim 43 wherein said impacting said crash cushion with said vehicle comprises impacting said front of said crash cushion and thereby compressing at least some of said plurality of said cylinders from said front to said

rear of said crash cushion, and wherein said plurality of said deflector skins are not substantially deformed by said impacting said front of said crash cushion and said compressing said at least said some of said plurality of said cylinders.

49. A method for assembling a crash cushion system comprising:

5 providing a plurality of resilient, self-restoring cylinders each having a substantially vertical longitudinal axis and an outer surface comprising a curved portion, wherein at least some of said cylinders each comprise a deflector skin mounted to said cylinder over at least a portion of said curved portion of said cylinder, said deflector skins each having a curved contour shaped to mate with
10 said outer surface of corresponding ones of said cylinders;

arranging said plurality of cylinders in an array having a front, a rear and a side;

positioning said cylinders having said deflector skins along said side of said array; and

15 orienting said cylinders having said deflector skins with said deflector skins facing outwardly from the side of said array so as to be exposed to an impacting vehicle.

50. The method of claim 49 further comprising securing said plurality of cylinders to each other.

20 51. The method of claim 50 further comprising securing said plurality of cylinders to a frame.

52. The method of claim 49 wherein said deflector skins comprise a plurality of first deflector skins, and further comprising a plurality of second deflector skins mounted on an outer surface of a corresponding one of said
25 plurality of said first deflector skins.

53. The method of claim 52 wherein said each of said plurality of said second deflector skins is substantially flat and extends tangentially from said outer surface of said corresponding one of said plurality of said first deflector skins.

54. The method of claim 52 wherein each of said plurality of said second deflector skins has a leading edge and a trailing edge, wherein said leading edge of each of said plurality of said second deflector skins is secured to said corresponding one of said plurality of said first deflector skins and wherein said trailing edge is a free edge.

55. The method of claim 54 wherein each of said plurality of said cylinders defining said side comprises an outermost vertically oriented tangent, and wherein said leading edge of each of said plurality of said second deflector skins is mounted on said corresponding one of said plurality of said first deflector skins forwardly of said tangent on said corresponding one of said cylinders.

56. The method of claim 49 wherein said outer surface of each of said cylinders defines a perimeter of said cylinder, wherein each of said deflector skins extends around only a portion of said perimeter of a corresponding one of said cylinders.